DOCUMENT RESUME

ED 323 515 CS 010 228

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TITLE Patterns of Children's Reading and Spelling Substitution Errors: "DO NAT DSTRB GNYS AT WRK."
PUB DATE Oct 90
NOTE 68p.; Report prepared for the Lucerne Valley Unified School District, San Bernardino County, California.
PUB TYPE Information Analyses (070) -- Reports - General (140) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Children; Elementary Education; Error Analysis (Language); *Error Patterns; *Reading; *Spelling
IDENTIFIERS Research Synthesis; *Spelling Patterns

ABSTRACT

Intended to provide a knowledge base for intervention and remediation, this report summarizes what is currently known about patterns of children's reading and spelling substitution errors, with an emphasis on specific examples of the kinds of mistakes actually made by students. Following an introduction, preface, and preparatory quotes, the report is in nine sections: (1) Words: A Complex of Features; (2) Substitution Errors and Error Patterns; (3) Generalizations and Rules of Thumb; (4) The Assumption of Specificity; (5) Miscue Analysis and the Role of Context; (6) Developmental Spelling; (7) The Skill Based Approach; (8) Error Analysis Can Reveal Strengths; and (9) Conclusion. Forty-nine references are attached. (SR)

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Patterns of Children's Reading and Spelling Substitution Errors

"DO NAT DSTRB GNYS AT WRK"

ED323515

prepared for

Lucerne Valley Unified School District
Ron Peavy, Superintendent
San Bernardino County, California

October 1990

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CS010328

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CONTENTS

Introduction	i
Preface	ii
Preparatory Quotes	iii
Words: A Complex of Features	1
Substitution Errors and Error Patterns	8
Generalizations and Rules of Thumb	12
The Assumption of Specificity	15
Miscue Analysis and the Role of Context	31
Developmental Spelling	37
The Skill Based Approach	44
Error Analysis Can Reveal Strengths	54
Conclusion	56
References	59

INTRODUCTION

A quick survey of the literature on the topic of patterns of children's reading and spelling substitution errors indicated no available source of systematically presented information. This report provides that source by compiling the scattered available knowledge.

While reading and spelling are, of course, different learning domains, even so the literature reviewed did not clearly indicate that students who tend to make a certain kind of error in one do not tend to make a similar error in the other. Indeed, in practice learning problems in reading and spelling tend to go hand-in-hand. Further, Spache (1981), a specialist in both areas, has stated:

> The fact that spelling and reading are not identical processes leads some to question whether identifying the pupil's knowledge and use of phonic skills in spelling is relevant to his phonic practice in reading ... I do not subscribe to the current tendency to fragment the spelling or the reading process into bits of behavior that are supposed to be independent ... the facts do not support the notion that spelling and reading demand completely different abilities. (pp. 268, 269)

Consequently, in this presentation generally reading and spelling errors are purposely not distinguished.

PREFACE

When a child looks at one word and reads another, that's an error; when a child hears one word and spells another, that's an error. Sometimes the word said or written is almost exactly like that seen or heard, yet an error even so, since effective communication, whether in reading comprehension or in written expression, requires production in a standard format, i.e., Standard English. These kinds of errors strongly indicate the student's reading and spelling strengths, in that the mistake was so close to being correct.

Sometimes the word said or written is considerably different from that seen or heard, truly an error and obviously so, since it is quite divergent from what is typical or common for the age. These errors indicate weaknesses in the student's learning since a closer approximation would be expected.

This report summarizes what is currently known about errors of these kinds. At this point in time this information mainly outlines patterns or groups of these errors. Some of these groupings are tentative, waiting on further research for confirmation. Others appear as fairly sound, reasonably documented types of error patterns.

There are several ways knowledge of a student's reading and spelling errors can aide instruction:

(1) First, when errors group together this suggests a pervasive and persistent problem with a particular skill area.

(2) Second, understanding a student's error tendencies can assist in judging the relative severity of the problem.

(3) Third, presenting a student's error tendencies to parents assists them towards a clearer comprehension of their child's learning progress.

(4) Fourth, when discussing reading or spelling problems with other educational professionals a summary statement of the issues as observed in daily classroom practice helps pinpoint to them the "eyes of the teacher" point of view.

(5) Fifth, comparison to the error tendencies presented in this report can help guide further information gathering.

In all regards, though, what is known about children's reading and spelling substitution errors presents a useful format for developing corrective instruction. And this is, indeed, the main purpose for this report: To provide a knowledge base for intervention and remediation.

PREPARATORY QUOTES

Errors are unintentional and unprofitable intrusions upon the consciousness of the reader. They introduce in accidental ways alternative forms in spots where usage has stabilized a particular form. They demand energy without giving any return in meaning; they shift the reader's attention from where s/he is going (meaning) to how s/he is getting there (code).

Mina Shaughnessy
Errors and Expectations

In any individual miscue, it is rare that one can say with strong assurance what exactly has taken place, but the patterns which emerge produce a picture in depth of the reading process in the reader.
Such insights reveal not only weaknesses, but strengths as well, because the miscues are not simply errors, but the results of the reading process having miscarried in some minor or major ways.

Kenneth S. Goodman
Analysis of Oral Reading Miscues

The knowledge of letter-sound correspondences is not a closed compartment in the child's thinking that is functional only in reading. To really understand grapheme-phoneme relationships, the child must comprehend and be able to use them in reading, spelling, writing and listening.

George Spache
Diagnosing and Correcting
Reading Disabilities

If we know the sounds of a word in English, we can't know how to spell it; if we know the spelling, we can't know how to pronounce it.

Otto Jespersen
Essentials of English Grammar

WORDS: A COMPLEX OF FEATURES

A word is composed of a variety of details. For example, each has a grammatical class (as, verb), a meaning (as, lamp means a device that produces light), a "look" (as, number of tall letters), a syllable length (as, ed-u-ca-tion-al), a way it is written and said (as, written enough, but said "enuff"), and so forth.

At any given time several of these details or cues may be available as aides for word pronunciation or spelling. The more aides available to, and used by a student, the more likely the student will say or spell the word correctly.

The Variety of Cues

There are several word recognition cues that are considered as "standard" (Gibson & Levin, 1976; Harris & Sipay, 1980; Spache, 1981). These apply equally as aides to correct reading and spelling.

The first are graphic cues. These derive from how the word "looks". Examples would be:

(a) Word length, especially when the words begin with the same letters, as me, mean, morning. If the word looked at and that said, or the word heard and that written are different in length, then it should be clear that an error has been made.

(b) Distinctive configuration, outline, or overall shape, such as produced by a unique pattern of ascending or descending letters (as, tool).

(c) The specific sequence of letters (o r d e r) or syllables (or der).

(d) Common initial and final letter clusters, since initial letters are seen first and prefixes, especially, tell much about what the word might be, while word endings and suffixes also aide in limiting choices (e.g., only certain words end in -ke).

(e) The upper halves of lower case letters, which give more information than the lower halves, and so, for example, words with a number of tall letters tend to be more easily retained.

(f) Knowledge of spelling rules (example: sx does not occur in English and so "does not look right").

All these types of graphic or visual cues aide word recognition by eliminating possible choices for target words. What choice a child finally makes, if an error, helps us to understand to what extent graphic information was used.

For example, "it seems reasonable that if the graphic display

is three and the child says there, he is telling us something different about his reading process than if he says yesterday to three. The response four to the printed three gives us still different information" (Gibson & Levin, p. 279).

The second are phonic cues. These relate to the patterns of sounds unique to each word. These will be helpful to the extent that the child knows how to "say" the various letter, letter blend, and syllable sounds which make up the word (y, c, cl-, aw-, kn-, -igh, -ake, -tch, etc).

Phonic cues are used in reading to say what is seen, and in spelling to write what is heard. Phonic plus graphic cues most often are referred to a graphophonetic cues. In practice, children commonly use both at the same time.

The third are semantic cues. Examples would be knowing a word's meaning, using the context of a sentence to help guess the word, using knowledge of a part of the word to unlock the rest (waterfall), and so forth. These cues relate to the word's definition.

The fourth are syntactic cues. These relate to grammatical function, and the fact that only certain kinds of words fit into certain "slots" in English sentence patterns. Also, the grammar class of most words is clear at sight (nouns, verbs, adjectives, and so forth).

The term context cues most often refers to syntactic plus semantic cues working together as word recognition cues in a sentence, paragraph, or page of text.

The fifth are orthographic cues. These relate to the unique spelling patterns of English, which are written arrangements of letters which stand for a specific pronunciation (i.e., a cluster of written letters that corresponds to a sound pattern). Rules like, "i before e except after c" are of this type. Other examples are rules for consonant doubling (swimming), contractions (aren't), and rules for possessives ('s). These cues can also be significant aides to reading.

How the Cues are Used

"Beginning readers have difficulty in distinguishing among a letter, a word, or a sound of a letter, and in recognizing that a letter or a word is being used in incorrect order" (Spache, 1981, p. 237). Even using the first letter or letters as a cue can take many months to develop, as does associating sounds with letter clusters. The use of context cues, though spontaneous at early ages, really develops at later grades.

The available research generally indicates: (a) that good readers and spellers are effective with all the variety of cues,

and gather information from word meaning, grammar, "look" and "sound", spelling rules, and "cross-relate these in an active process of search and check" (Clay, 1977, p. 124); (b) that all students tend to vary in their ability with the effective use of the variety of cues; (c) that the various cues are not always of equal importance in "unlocking" a word (for example, phonic cues may be of limited use with irregular words like guard, and graphic cues may be of limited use with short, functional words like to, for, in).

Children's responses to teaching will result in individual patterns of strength and weakness in decoding (reading) and encoding (spelling) words. In word analysis this profile is pitted against the variety of cues available for use. A mismatch results in reading and spelling errors.

On the other hand, a correct response indicates that the student effectively tied together a number of word features: Perhaps the first letter as a cue, the word's meaning, it's sound pattern, the number of syllables, or it's general visual aspect.

"Even single words are not necessarily recalled as units, but as a bundle of different aspects which are only loosely tied together ... when a sufficient number of aspects are retrieved (from memory) the word is reconstructed" (Kintsch, 1970, p. 266). The formula is: Recall = memory retrieval = a reconstruction of a plausible or probable response on the basis of whatever information is accessible from memory.

The Word Superiority Effect

This phenomena has also been phrased as the "drift towards English" (Gibson & Levin, 1976), or the "word apprehension effect" (Kintsch, 1970). Here are some examples from reading and language research which illustrate the meaning of these ideas:

o High frequency words were spelled correctly twice as often as low frequency words.

o Pronounceable words, or those with regular spellings, were recalled and remembered better (example: sland vs ndasl).

o When average level students made mistakes in reading words in a list, the greater majority were real English words (i.e., substitutions of one real word for another, not non-sense words), and almost always the substitutions were words the student had encountered before.

o When children were given a choice between words, they commonly chose the more English-like (e.g., klek vs dlek).

o Children commonly changed non-sense words, which had been inserted into memory lists, to real English words (e.g., danxe changed to danger in recall).

o Children were able to recall much longer letter sequences when they were real English words (versus random letters).

o Spelling and reading errors tend to occur primarily in the middle of words (i.e., the first and last letters, or the first and last couple of letters, are often correct). This might be termed the "initial-terminal-medial effect".

In short, the word superiority effect "pulls" student responses towards real English words, towards errors that share many characteristics with target words, and generally towards correct reading and spelling. This "pull" is weaker in the case of errors. In the cases of extreme errors it might even be termed the "word inferiority effect".

Another point of significance for this effect is that it highlights the fact that children's reading and spelling errors follow consistent, regular patterns.

Ease of learning index

Some words tend to be easily learned by children. Characteristics of these words as listed by Harris and Sipay (1980) are:

o Words the child wants to learn.

o Words that are meaningful or personally relevant.

o Words that are familiar in whole or in part.

o Words that have have strong emotional overtones.

o Those that are pleasant sounding.

o Those that evoke imagery.

o Concrete words like nouns.

Kintsch (1970) lists other aspects of words that may assist memory:

o Frequency or how common.

o Pronounceability.

o Syllable length.

o Association value (ease of mentally linking with other words or certain ideas).

o Memory aides, helps or assists given at original learning.

o Number of exposures or length of exposures to the word.

o Intervening activities since last exposure to the word.

o Von Restorff Effect: If a word in a series is in any way outstanding the likelihood of recall is considerably increased.

o Number and kind of memory prompts/cues available at "test time".

In short, there are a number of characteristics of words, and of the child's experiences with them, that relate significantly to how how easy or difficult they are to remember (how to pronounce or spell). This may be called the "ease of learning index".

The Scale of Regularity

Our English alphabet contains twenty-six letters. These represent more than forty speech sounds. Thus many letters and letter combinations must stand for a number of sounds. Also, English has borrowed a large number of words from foreign languages. Easy, clear rules for reading and spelling cannot, consequently, be created.

As a result there is much inconsistency and irregularity in English. The following samples (Heilman, 1968; Sharp, 1982) highlight this fact:

Example 1: Long vowel a as in day, fate, sail, reign, great.

Example 2: Long vowel u as in view, tube, due, suit, you.

Example 3: Silent consonants as in knit, yellow, listen, duck, comb, wrist.

Example 4: The "neither short nor long" vowel-with-r sound as in car, her, form.

Example 5: The most frequently heard vowel sound in English, schwa a, has fifteen common ways to spell it, such as China, metallic, button, walrus, physician.

Example 6: The sh sound is only spelled this way phonetically, but has a variety of other non-phonetic spellings as in oceanic, ocean, chef, special, insurance, fissure, Russia, satiate, caution.

The six vowel sounds of English spell an average of ten sounds each. Too, even quite a number of the most frequent words have irregular spellings, as in: any, could, come, are, do, too, been, was, there.

Lastly, consider this citation by Chomsky (1970, p. 309):

> I take it you already know of tough and bough and cough and dough?
> Others may stumble but not you, on hiccough, thorough, laugh and through.
> Beware of heard, a dreadful word, that looks like beard and sounds like bird.
> And dead: It's said like bed, not bead -- for goodness' sake don't call it deed!
> Watch out for meat and great and threat (they rhyme with suite and straight and debt).
> A moth is not a moth in mother nor both in bother, broth in brother.
> Here is not a match for there, nor dear and fear for bear and pear.

And then there's dose and rose and lose -- just look
Them up -- and goose and choose, and cork and work
And ward, and font and front and word and sword,
And do and go and thwart and cart -- Come, I've hardly
Made a start! A dreadful language? Man alive. I'd
Mastered it when I was five.

While it is true that English has many regularities that make reading and spelling easy, the large number of "oddities" considerably complicate learning basic skills. Each reading and spelling mistake can be weighed on the scale of regularity. If a heavy weight registers (i.e., there are irregularities about how the word is to be said or written), then it is likely that this fact has played a role in the error.

Conclusion

This section has presented four indices which, taken together, aide understanding of children's reading and spelling substitution errors. These indices provide general background information.

Since there is, as a matter of fact, no currently available knowledge as to "why" children make the kinds of substitution errors they do, the only recourse possible by way of explanation is to summarize those known aspects of words, and of children's experiences with them, which may have played a role in the particular error.

This type of "explanation" de-emphasizes the underlying "why" and instead puts the focus squarely on the patterns of errors made. Review of a student's error patterns gives the best information obtainable about "why" the mistakes occurred, and what kinds of errors might be expected to occur in the future.

In summary, the four indices are:

Index 1: The variety of cues. When errors occur students either are not aware of the available cues, or are not using them effectively.

Index 2: The word superiority effect. When errors occur they should be more or less like real English words and should more or less share many characteristics with target words. Also, errors should occur primarily on the middle portions of words.

Index 3: The ease of learning index. When errors occur this index is low, and the words are thus harder to learn or remember. In any given error a variety word characteristics may be in play, or perhaps just one.

Index 4: The scale of regularity. When errors occur some aspects of the words may be irregular. If so, it is likely that this fact has played a role in the error.

SUBSTITUTION ERRORS AND ERROR PATTERNS

Traditionally substitution errors have been distinguished from "additions" (of sounds), "omissions" (of sounds), "mispronunciations", or "reversals or transpositions". Whole word errors not falling in these categories have been, by default, "substitutions".

It is most practical, though, to consider substitution errors as simply mistakes whereby the student reads or spells one word for another. Typically the word substituted is a real English word, almost always one the student has encountered before. However, non-sense word substitutions occur not infrequently. Substitutions have been described in several ways, for example:

o Substitution of a word (the traditional definition): to/do, ever/never, last/fast, mirrer/mirror, haik/hair, eracer/eraser, broon/broom, drup/drum.

o Addition of a letter: carefull/careful, comby/comb.

o Omission of a letter or syllable: clar/clear, peppr/pepper, visting/visiting.

o Transposition of letters or syllables: librety/liberty, telho/hotel.

o Letter reversal or inversion: big/dig, day/pay, mit/wit.

o Mispronunciation: pin/pen, dog/dug, hat/hot.

o Dialect: hep/help, be/is, estop/stop, dis/this, ken/can, cus/cause, git/get, walken/walking.

o Rule errors: cant/can't, tim/time, helo/hello.

In the general sense, these are all substitution errors in that one word is said or written in place of another. In the specific sense these, and many others that could be mentioned, are types or patterns of substitution errors. For example, carefull/careful is a substitution by addition of an extra letter, peppr/pepper is a substitution by omission of a necessary letter, pin/pen is a substitution of one medial short vowel for another, and so forth.

There is but limited information available about the rate at which substitution errors are made. A tentative guideline may be drawn from the research of Clay (1977) who reported that seven and eight year-old children (second and third grade), divided by levels of progress in reading, made these proportions of mistakes: Very below average students, 1 error in every 3 words; below average students, 1 in 8; above average students, 1 in 15;

accelerated students, 1 in 37; and the very best readers made less than 1 error in every 100 words.

These ratios highlight that there are substantial differences in the number of reading substitution errors when good and poor readers are compared.

Sources of Error

Clay also suggests several sources of error, for example:

(1) An error may result from interference when strongly competing ideas rise to the "tip of the tongue" first, and obscure the correct response. Competing responses could be words of similar meaning (quick/fast, look/see), words of similar grammmatical function (run/jump/look), words which represent opposites (right/left, up/down), or words which fit the grammar of the sentence, fit the meaning, or have identical letter components (Martin was the boy/Martin saw the boy).

(2) An error may result from frequently practiced responses masking, or preventing the use of, other responses. An example would be are/am (I are skating).

(3) Errors may be learned by systematic practice of wrong responses. Silent reading, or reading to another child, can create this situation (example: Oh Tim/No Tim, Oh jump/Go up).

(4) An error may be due to immature oral language habits (I are/am running), immature visual perception habits (at the/after), slow retention of new word forms (discounted/discount), or difficulties with standard rules (here's/here is).

(5) An error may reflect ignorance of the cues that could be used. Such cues could be word meaning, fit to the context, sound similarity or look similarity.

(6) An error may result when a child does not search effectively for the appropriate word. For example, the child may habitually say or think, "I don't know", when confronted with an unfamilar word. In Clay's research 30% or more of students typically used this response when they encountered an unfamilar word. These children were missing opportunities to learn error correction techniques.

(7) An error may result from an increase in speed of reading. When a student reads too fast mistakes tend to be glossed over.

(8) An error can occur when the child's expectations change markedly. This would be predicted, for example, in an abrupt change of basal text, or in a sudden introduction of stories without (the usual) picture cues.

Cohn and D'Alessandro's (1978) study of the reading errors of children aged 7 to 17 indicates these additions to Clay's list of error sources:

(9) Children may make a mistake in decoding yet read the word correctly in other instances. When the authors asked children to try the word again, 50% correct reading was found, and 29% correct reading was found on the remainder of words when the teacher asked probing questions, such as, What are the frist two letters?

(10) Phonetically inconsistent words (e.g., tongue, guard, know) are challenging to read and spell, and require extra effort to practice and master. These are the "daemons".

(11) Words can be more difficult to read in a list than in the context of a story or paragraph where many more cues to pronunciation are available. The same is true of spelling when the dictated word is used in a spoken sentence.

Patterns Tell the Story

So far a very practical point of view has been outlined for understanding reading and spelling errors. This view helps to give definition to the specifics of student error tendencies. Also, some general guidelines have been given as to the rates at which errors tend to occur.

As regards the proposals of sources of substitution errors, it may be firmly concluded that reading and spelling mistakes can have a variety of causes. Consequently attributing a particular error to a particular cause can greatly oversimplify the real situation. Since learning reading and spelling skills is a complex, over-time endeavor, in all liklihood a particular mistake is due to more than one cause.

A fourth point is that there is considerable consensus within the literature surveyed that it is the pattern, or conglomeration, of errors that tells most strongly about a student's learning needs.

Ganchow's (1981, 1984) term is "error pattern analysis". By this she means that examination of a sample of errors reveals patterns from which children's learning strategies may be derived.

This is possible since: (a) children's errors are not random or capricious, rather they stem from their "hypotheses about the rules governing a particular task"; (b) some errors are more productive than others, are closer to correct reading or spelling; (c) given a sufficient sample of a student's errors, the student's "rule system", or guidelines for pronouncing or writing words, can be simulated or estimated.

This gives us important information about the student's

knowledge and use of the regularities underlying the spelling and word pronunciation systems: The rules for correct writing and reading. When children encounter a new word they make predictions as to how it should be said or written. Then one of these predictions is chosen. Typically whenever that word or word part is again encountered the same prediction occurs.

This regularity, plan, or program is the core of "error pattern analysis", as the same mistakes tend to occur over and over since a large number of words have the same or similar components (examples: prefixes like in-; medial short vowels like bet,get; look-alike letters like b,d; initial consonant clusters like th,gl; and so forth).

This report surveys what is known about these error patterns. While a variety of descriptive categories will be presented, none of these are definitive, and one should feel free to utilize these verbatim, combine categories and use a given label, or to completely rename a pattern.

Gibson and Levin (1976) have provided a succinct statement for this heading:

> Learning to read is to learn a system of rules for extracting information from text ... what is learned are those strategies that extract information efficiently ... errors that children make provide insights about their strategies of reading ... the most common errors are substitutions, that is children invent words for those that are actually printed (p. 322).

The same rationale would apply, equally, to children's errors in spelling.

GENERALIZATIONS AND RULES OF THUMB

Drawing from the variety of sources as listed in the references gave a number of practical recommendations. Quite often these were based on research reports, although the common experience of educational professionals was also utilized.

These proposals represent firm conclusions from the knowledge available, and can be used as guidelines when analyzing reading and spelling errors into patterns. Together they form a normative base line of fundamentals.

(1) Substitution errors can be strongly influenced by teaching method. Visual or sight word approaches tend to correlate with gross word form substitutions (stool/tool), graphic similarity, especially of beginning letters (kind/kiln), many non-responses (limited decoding skills), and incorrect letter substitutions producing non-sense or meaningless words (student does not further check on meaning or sound/phonic similarity, hence non-sense words).

A heavier emphasis on phonics tends to produce a large number of sound-similar errors (bin/tin), also of non-words (student does not further check on meaning or graphic similarity), a larger proportion of errors that do not make sense in context, and quite often errors which have a similar syllable structure.

Students trained by a meaning emphasis method (context cues) tend to produce reading and spelling substitution errors that contain a larger number of real words, fit closely the context, and contain only about 40% or so good graphic or phonic similarity.

These three "classic" patterns are likely not encountered often in reality since contemporary reading and spelling methods are typically eclectic, employing a combination of approaches: Memorize through repeated exposure how the word looks (sight), learn sound patterns (phonic), encounter the word in a story or paragraph (context).

KEY: How a student has been taught to read or spell can have a profound impact on the kinds of reading or spelling mistakes made.

(2) Graphic similarity (the way the word looks) is a normal reaction to reading or spelling unknown words, and should be present if the student is not blindly guessing or drawing substitutions at random. First or last letters, in particular, should match.

KEY: While there are a number of kinds of graphic similarity, in general student errors should "look like" the target words. A high degree of graphic similarity should be expected.

(3) A large number of substitution errors are "phonographically similar". That is, there are aspects of similarity as to how the two words look and as to how the two words sound (e.g., alone/along). This fact can make it very difficult, if not impossible, to judge whether any given error is more "look/graphic" or more "sound/phonic".

KEY: Many times distinguishing between whether a substitution error more "sounds alike" or "looks alike" can be challenging, to say the least.

(4) Even early or good readers, especially at younger ages, can and do read correctly words that they spell differently (example: read fair, spell far).

KEY: Oral reading and written spelling are reasonably different areas of learning. Yet, consistencies commonly occur.

(5) The majority of oral reading errors are quite logical, and, especially if from paragraphs or stories, grammatical. This is shown by children's tendency to spontaneously substitute words of appropriate tense (sent/went), number (boys/toys), function (sadly/gladly), and so forth.

KEY: A large number of reading errors should be one-to-one substitutions in terms of grammar or "context fit".

(6) An accurate picture of a student's usual oral reading or spelling errors is best obtained from the functional reading or spelling level. Students can make twice as many errors on more difficult assignments, for example.

Errors occurring when the student is 90% correct are most often due to carelessness; those occurring when the student is 75% correct are the ones that typically occur; those occurring when the student is 50% correct (frustration level) are not often even close approximations to the word.

KEY: Do not require the student to read or spell too difficult or too easy words. Error patterns can vary from very easy to very difficult materials.

(7) For best reliability the number of errors analyzed needs to be at least 25, with 75-100 sometimes recommended. Repeated testing (samples over time) may be required.

KEY: Too few words sampled may give an inaccurate and unreliable estimate of a student's reading or spelling error tendencies.

(8) More can be learned by an untimed, several occasion error collection than by observing a timed response in one session. It is usually informative to allow more opportunity

and extra time for the student to go over those words originally mispronounced or misspelled. Since words are recognized in a fraction of a second, 5 seconds allows almost ten times the normal rate for analysis and recognition.

KEY: Patience is important in understanding a student's reading and spelling difficulties.

(9) The characteristics of errors collected can vary from one selection to another (word list, basal text paragraph, student selected recreational reading, spelling test) -- sometimes quite considerably.

KEY: Vary the sources from which errors are sampled.

In summary, the best practice method of collecting student reading and spelling errors would utilize the recommendations given above. In reality, of course, time and resources can be at a premium. Even so, an accurate overview of student error patterns would at least consider the points mentioned.

THE ASSUMPTION OF SPECIFICITY

This assumption (Stanovich, 1986) rests on the belief that each reading or spelling error, or error pattern, is indicative of a certain kind of brain-behavior event. This would be something that occurs "within" the student. These events are not observable. They cannot be seen (spelling) or heard (oral reading) in student work samples.

Examples of Specificity

These events are cited to "explain" or give reasons for the observed errors. Some illustrative examples, only some, are as follows:

o Poor auditory discrimination: bad/bat, bit/bet, cown/crown, plsh/polish, rut/rust.

o Auditory confusion: mat/nat, that/fat, bad/dad, sing/zing, yot/yes, brd/bird.

o Auditory channel problems: bit/bet, and/tan, second/sing, hd/hand, fed/fled, phe/home.

o Auditory-visual associative memory deficits: house/home, pool/patio, tiger/lion.

o Lack of phonics ability: hires/horses, bothry/brother, meciline/medicine.

o Poor visual imagery: enuff/enough, clim/climb, krak/crack, was/saw, on/no, me/we, ship/snip, red/rod, dogs/dog.

o Visual channel deficits: teh/the, baBy/baby, cAt/cat, m/w.

o Poor visual memory: hapy/happy, own/now, tuff/tough.

o Inability to revisualize: feling/feeling, stret/street, kepr/keeper, aminl/animal, doz/does.

o Classic dyslexic errors: sopt/stop, paly/play, karter/character, asrtonomony/astronomy, not/no, justist/justice.

These are Interpretations

Most of these types of "explanations" involve some sort of "auditory" or "visual" terminology. Others refer to "modality" strengths or weaknesses. Yet others refer to certain kinds of learning disabilities such as "dyslexia" or "dysgraphia".

In all cases, though, the reference is to a type of event, state, or occurrence internal to the student. These events are presumed to "cause" the errors observed.

One cannot argue with such beliefs. It can only be pointed out that:

(1) They are interpretations based on what students do, not what students actually do -- what is seen or heard.

(2) The available research clearly does not support the fact of such interpretations (Spache, 1981; Stanovich, 1986).

(3) At the present time they are of very limited or no utility in planning practical interventions for student learning problems.

(4) It is not necessary to know these "why" explanations since careful review of a variety of student errors will reveal the patterns of the problem -- as regards word characteristics.

(5) Knowledge of these word characteristics leads directly to practical, efficient educational remediations (example: the error hapy/happy leads directly to training in consonant doubling; training "poor visual memory" is neither practical nor efficient).

Based upon the above conclusions, in the "event chain": Brain events ... lead to ... error events ... lead to ... remediation events, is is currently not necessary to speculate on the first link, "brain events".

A related question is, Can these "explanations" tell why a student is a poor reader or speller, or is learning disabled?

What the Research Indicates

Stanovich (1986) has systematically reviewed the literature on this topic. He has made several relevant conclusions:

First, studies of the distribution of kinds of errors made across levels of reading ability (above average, average, poor) have consistently indicated that poor reading students made more errors of all types.

Second, the studies available do not demonstrate that the error profiles of learning disabled students differ reliably from those of other poor readers.

Third, those characteristics that differentiate just below average readers from just above average readers are the same characteristics that differentiate very below average readers from average readers.

These points are further substantiated, for spelling, as follows:

(1) Holmes (1977) compared the types of spelling errors made

by average versus very poor fifth grade readers. She concluded that there is no support for the belief that very poor readers show different patterns of spelling errors than average readers. The poor readers made a larger proportion of errors of all types. That is, the percent of errors in all categories was the same for both groups. Examples of the spelling error categories used in this study are:

- o Deleted vowels: resonble/reasonable.
- o Vowel additions or omissions: orader/order, rech/reach.
- o Consonant deletions: supise/surprise.
- o Consonant substitutions: cichen/kitchen.
- o Phonetic substitutions: lite/light.
- o Consonant additions: egel/edge, farmiliar/familiar.
- o At least first and last two letters present: crewn/grown.
- o Reversals: reslut/result.

(2) Varnhagen (1988) compared third grade average level readers to fifth grade very poor readers (special education students) on spelling error profiles. Results indicated that the fifth grade poor readers were learning to spell according to normal developmental patterns, although at a much slower rate. The learning disabled readers' spellings were not unique or special, rather they made errors typical of the younger students.

(3) Nelson (1980) studied children aged six to twelve. When she compared normal and dyslexic readers' spelling errors, no significant differences occurred between their error patterns.

(4) Cook's (1983) study was based on her literature review which indicated that "some evidence exists that spelling error pattern differences (between reading disabled and normal reading pupils) may be more apparent than real" (p. 121). Her research compared the spelling error types of normal achieving second graders and reading disabled ("dyslexic") fourth to eighth graders. The spelling achievement of the older students was equal to that of the younger children.

She concluded that, "The spelling of the older dyslexic and younger normal achievers, equated on spelling achievement, did not differ significantly" (p. 125).

For example, phonic errors (stuck/struck), order errors (srtuk/struck), and silent letter errors (new/knew) occurred in the same proportion for both groups. In short, older learning disabled students made spelling errors virtually similar to those of younger students -- a unique "dyslexic" spelling error profile was not found.

In conclusion of this research, it is clear that at the present time there exists no known, research based pattern or profile of spelling errors that are distinctive for "poor reader", "dyslexic", or "learning disabled" students. This holds true for both reading and spelling.

Instead, these underachieving students develop reading and spelling skills at a slower rate than age mates, make a larger number of errors of all types, and make types of errors similar to those of younger students.

Also, attempts to relate kinds of errors to specific "brain events" or "psychological processes" are, at present, speculations, without any substantiation in scientific research.

Subtypes

There have been many attempts to isolate "subtypes" (i.e., distinctive error patterns) in the reading and spelling errors of students with known learning handicaps. To date these have met with little success. To paraphrase Wiederholdt (1988), the effectiveness of these has never been confirmed through objective research, and many common statements about spelling errors are primarily based on unsubstantiated speculation.

Such statements would be, for example, that such errors are "caused by" deficits in auditory discrimination, visual imagery, memory, attention control, or phonics ability. Stanovich (1986) has pointed out that, "There is no agreed-upon taxonomy of subtypes ... subtyping work is in an embryonic stage" (p. 114).

Even so, the types of errors made by students with learning disabilities can be informative. As Kavale and Forness (1987) pointed out, the practical goal of reviewing student work samples is to derive ideas or to form hypotheses about particular ineffective reading or spelling strategies. These authors believe that "armchair" (i.e., experience-based rather than research-based) classifications of errors are not "false" or "misrepresentative", but rather are "adequate in a practical sense."

This means that they can have utility for the planning of remedial education despite lack of research support for their "fact". This is true since knowledge of the "types" of error patterns that can occur simply can be taken at face value -- without mention of the "label" or "subtype" appended. Patterns are patterns, and, to make special note, are simply what children do when confronted with reading and spelling assignments.

To Illustrate Subtypes

In this spirit some examples are given of the kinds of reading

and spelling errors made by students with determined learning disabilities.

Ellis (1984) distinguished between the errors made by "surface" and "deep" dyslexia and dysgraphia (reading and spelling problems of a rather severe nature).

The "surface" problems mainly involve difficulties in establishing grapheme-phoneme (written-sound) relationships. This is believed to be due to an ineffective connection bwtween the visual and sound processing systems. These students are believed not to recognize a word as a whole, but attempt the strategy of "sounding out" in order to find a good possibility for the word seen (reading) or heard (spelling). Of course, such a student would likely be more adept with phonetically regular words. Typical errors include:

o Phonic approximations: (non-words) izland/island, sudger/sugar, rikunt/recent, brode/broad,; (real words) decease/disease, just/guest, face/phase, grinned/grind.

o Homophone exchanges: moan/mown, sum/some, for/four, sail/sale.

o Visual errors: thought/tough, precious/precise, sign/sing, forgiven/foreign.

o Phonic spelling errors: neffue/nephew, bisket/biscuit, suttel/subtile.

o Misspellings based on partial knowledge: purough/borough, sward/sword, yhagt/yacht.

The "deep" problems mainly involve additional difficulties with word meanings, additional to the "sound and look" problems common to surface dyslexia. This is presumed to be due to an ineffective connection between the visual and sound processing systems, and the semantic or "word dictionary" system. Typical errors include:

o Semantic substitutions: moon/star, fact/reality, pixie/gnome, dress/clothes, picture/artist, pray/belief, perhaps/quite, monkey/ape, rule/inch, minimal/lessen, stamps/postage, thinking/student, crocodile/turtle.

o Visual errors: soup/soul, single/signal, brush/bush, wedge/edge, and/said, lovely/loving, builder/building, choir/chair.

o Derivational errors: type/typing, graduation/graduate, speech/speak, merchant/mercantile, taps/tap, heroine/heroic.

o Function word substitutions: is/the, soon/now, from/although, with/or, because/has, in/his.

o Visual-then-semantic errors: chick/then (hen), ear/their (heir), orchestra/sympathy (symphony).

Lyon (1985) collected reading and spelling errors from students determined to have different kinds of learning disabilities. His "preliminary pilot research" indicated these groups, and their typical error patterns:

(A) Students with poor sight word vocabulary skills and poor phonics or word attack skills. This pattern is one of mixed auditory and visual processing weakness, as illustrated by:

o Confusion of visually similar letters or words: b/d, m/n, bay/play, pond/jump, dush/brush, m/w, cowp/comb.

o Vowel errors on internal details: wiglin/wagon, callip/colt, kal/key, tamy/ring, ledge/lodge, run/rain, tethbras/toothbrush, kenon /crayon.

o Errors in consonant blends: silo/smile.

o Errors in pronouncing all syllables: elgan/elegant.

o Bizarre or unusual nonphonetic misspellings: erwich/pencil, pone/spoon, thothurwlhy/toothbrush, bashel/basket, thunb/thumb, colown/clown, cleebra/celery, colt/salt, sigil/squirrel, garfara/giraffe.

These students clearly have serious reading and spelling problems. They have quite limited aptitude for learning the fundamental cues for word analysis. As a result they make very unusual or odd mistakes. These mistakes do not "look like" or "sound like" target words in many instances. Other errors may be:

o Letters bear little visual or graphic resemblance to target words, nor do they sound like them: pillup/pencil, ralg/ring, sasen/spoon.

o Omission of final sounds: totbu/toothbrush, cao/crayon.

o Labored blending: r-a-l/run, fig-et/fishing.

(B) Students with weak auditory and receptive language skills. These students have great difficulty with learning sound patterns (phonics) and in blending sounds together to make words.

o Consonant combinations: soll/smile, bus/blaze, fir/floor, sold/stylish.

o Omitted endings: ding/dangerous, exen/exercise, nay/rayed.

o Nonphonetic spellings: dab/run, bek/play, ilit/igloo, falup/fishing.

o Obviously poor word attack skills: wag/run, ban/play, winter/wagon, ball/brook, silno/smile.

o Unique vowel errors: blen/brush, kim/comb.

o Omitted final sounds or syllables: pen/pencil, caly/crayon, toth/toothbrush, pol/penny.

o Non-phonetic errors: stom/spoon, danit/pencil, dus/brush.

(C) Students with weak visual processing but developmental strengths in general language or phonics skills tend to make these kinds of reading and spelling errors:

o Phonetic misspelling: pensl/pencil, rin/ring, spune/spoon, craon/crayon.

o Substitution of visually similar words: word/work, where/what, back/duck, ded/ded, bim/dim.

o Errors on middle vowels: live/love, witch/watch, bore/bear.

o Substitutions for phonetically irregular words: bruk/brook, gluves/gloves, ruein/ruin, angcore/anchor.

Along the same lines Boder (1982) has devised a three-part scheme for listing reading and spelling errors. This scheme follows the traditional auditory (called "dysphonetic"), and visual (called "dyseidetic") dichotomy. She adds a third called "mixed", students with extreme learning problems indicating a combination of the two groups.

(A) Dysphonetic readers and spellers are claimed to show strengths in the "visual gestalt function" and weaknesses in the "auditory analytic function". These students have weak phonic decoding skills and tend to read words as (visual) wholes. They tend to guess at words from minimal cues (e.g., first or last letter or the length of the word). Non-phonetic errors predominate and visual strategies are used in word attack. Common errors include:

o Gestalt (form) substitutions: horse/house, sound/should, terrorist/tourist, monkey/money, stop/step, numeral/natural, charters/characters.

o Wild guesses from initial letter(s): blessing/business, diesel/doubt, doubt/dress, forget/foreign.

o Semantic substitutions: funny/laugh, track/train, ears/eyes, planet/moon, person/human, airplane/train, tomorrow/yesterday.

o Phonetically inaccurate: nernusless/nevertheless, herit/with, sleber/scrambled, sut/study, refct/rough, mar/marmalade, cattegt/cottage, anment/armament, rember/remember, beever/believe, coetere/characters, diter/doubt, ver/varnish.

o Reversals or transpositions: pothogarph/photograph, gril/girl, meridial/remedial, porgam/program, interver/inventor, wirters/writers, astromene/astronomy, forgein/foreign, cilmate/climate.

o Minimal phonetic similarity: cailt/kettle, coetere/character, geuvren/guarantee.

o Farfetched phonetic equivalents: twoter/tutor, highbrnashin/hibernation, insinyouweight/insinuate.

o Extraneous letter: cottegt/cottage, heautemn/human, not/no, justist/justice, astronomony/astronomy.

o Auditory discrimination: vantaskik/fantastic.

o Omitted syllable: rembr/remember.

(B) Dysidetic readers are claimed to show strengths in the "auditory analytic function" and weaknesses in the "visual gestalt function". These students have weak visual memory for letters and whole words. Learning sight words is difficult. They tend towards phonetic misreadings/spellings, even of non-phonetic words. Reversals and transpositions are common. They "read by ear", slowly and laboriously, sounding out even familiar words. Typical errors would include:

o Phonetic renditions of non-phonetic words: laf/laugh, awak/awake, lisin/listen, funey/funny, bi/buy, uncil/uncle, litil/little, gren/green, rit/rite, gon/gone, bi/buy, dus/does, plae/play, yor/your, bisnis/business, beard/bird.

o Visual or "look" reversals or transpositions: big/dig, was/saw, lever/revel, bib/did, make/wake, pets/step, me/we.

o Initial plus phonetic sequence: industrial/industry, hundred/hungry, positive/position, please/pleasure, charcol/character, pig/pigeon.

o Bizarre misspellings of non-phonetic words: fouldt/fought, glaf, lafg/laugh, blowe/blue.

(C) Mixed dysphonetic and dyseidetic reading and spelling patterns indicate a combination of the two types. These students have special problems in developing both sight reading vocabulary and phonic skills. They may not be able to read either by "sight" or by "ear". They experience problems both in learning what letters, letter combinations, and words "look like" and "sound like". Additional errors to those already mentioned, and more extreme, might be:

o "Extreme" spelling errors: r/stop, H/not, w/make, h/have, ge/play, Je/to, lek/little, llk/kitten, m/want, je/to, h/at, rit/faster, jukseupozion/juxtaposition.

o Persistent and unusual reversals or transpositions: h/n, v/y, llab/ball, brid/bird.

o Wild guesses based on minimal graphic cues: biab/bird, foich/fish, fish/father, able/elbow, cue/quilted.

o Use of first letter primarily: was/what, good/go.

o Phonetically inaccurate renditions: methen/mother, got/get, hand/holiday, canet/quit, sand/study, olect/honest, belhy/blood, pechy/pigeon.

Summary of "To Illustrate Subtypes"

The classifications of reading and spelling errors by three different researchers has been outlined. It is the commonalities of these error patterns that are obvious, their differences being relatively minor. All three propose that reading and spelling problems fall mainly into three groups: "Visual", "auditory", or "meaning".

Too, children with more extreme problems tend to exhibit combinations of these types, and to make unique, unusual, or odd kinds kinds of errors. It does occur, indeed, that students in public schools can be found who present to the teacher reading and spelling problems that may, appropriately, be judged "uncommon".

Even so, the interpretations of these error patterns as indicative of "processing problems" are currently speculative and tentative. It is not known whether these students make the kinds of errors they do owing to the reasons cited. What is known is that these kinds of errors do occur, typically in extreme cases.

Consequently, until further knowledge is available "why" they occur, the best course is to interpret them as they stand, as uncommon or unusual for the age.

Good Phonetic Equivalents

Boder puts strong emphasis on good phonetic equivalents. The reason is that if a student can produce these in spelling the auditory and phonetic skills of this type of student are far advanced compared to one who can only do so in a limited way.

A good phonetic equivalent is self explanatory as, "a misspelling that is phonetically accurate. It is a logical misspelling--a 'good error'--that can usually be sounded out to yield the original dictated word (p. 69)". Good phonetic equivalents are common in the misspellings of normal achieving students and of pre-school aged children who have had no formal reading or spelling instruction (i.e., "invented spelling").

Boder gives these guidelines for determining a good phonetic equivalent:

o Long vowel sounds should be accurately represented: way/weigh, flite/flight, paneting/painting, ried/ride, hay/hey, baer/bear, mayd/made, bech/beach, parte/party, ned/need, pepl/people, mie/my, bihe/buy, soop/soap, noa/know.

o Short vowel sounds may be represented by other accoustically similar vowels (sound very similar): onkul/uncle, cherity/charity, intertain/entertain, hed/head, frend/friend, agan/again, wont/want, or/are, uv/of, andr/under, somre/summer, hur/her, berds/birds, owt/out, cood/could.

o Neutral, soft, or schwa sounds may be represented by any vowel, or no vowel at all: lisn/listen, onrubol/honorable, rimember/remember, secent/second, rockit/rocket, backit/baskit, anamils/animals.

o An extra vowel may be introduced in writing a consonant cluster: insteruct/instruct, colimet/climate, poromes/promise.

o An extra e added at the end of a word is acceptable except when it makes another word: lisne/listen (not hole/hall), cilde/child (not cane/can), agine/again, jame/jam, acrose/across.

o e for long y: astronome/astronomy, industre/industry, stude/study.

o Letter-sound substitution: bt/but, ds/does, fne/funny.

o Omitted silent e: rid/ride, nam/name, gav/gave, snak/snake, ar/are.

o Consonant name displacing a vowel: hlp/help (l=el), frm/farm (r=ar).

o One vowel for a vowel digraph: bot/boat, bi/buy, tran/train.

o Omission of one letter in a cluster of three consonants: pespectif/perspective, respecfuly/respectfully, frenship/friendship.

o Substitution of an acoustically similar consonant: kedl/kettle, freguent/frequent, hithe/height, inportent/important, actif/active, rabsidy/rhapsody, timz/times.

o c for s followed by e or i: ced/said (not onect/honest), ciloet/silhouette (not justec/justice), sity/city, rasing/racing, cis/sis.

o c or ch for "k" or "ck" sound before e or i: cetl/kettle, sercet/circuit, crocidile/crocodile, cild/killed, sckool/school, klowne/clown.

o g for "j" sound: encureg/encourage, geustes/justice.

o Reversals are acceptable provided the letters intended are phonetically accurate: dib/did, qroov/prove, mau/man, me/we, saw/was, llab/ball, lob/ball.

o Suffixes such a -ed or -s may be omitted or added: kwilt/quilted, caricters/character.

o A farfetched good phonetic equivalent is made when a one-syllable nonphonetic word is used to represent a syllable in a multisyllabic word: infearyourty/inferiority.

Tovey (1982) analyzed the spelling errors of a large number of first graders. 53% were good phonetic equivalents and "displayed children's uncanny abilities to 'sound out' words successfully by devising logical and many times ingenious sound-symbol relationships" (p. 263). An extension of Boder's guidelines using Tovey's data would add the following:

o Failure to double a consonant: rober/robber, latr/latter, sumr/summer, beter/better, eags/eggs, wile/will, slipt/slipped, bune/bunny, spodid/spotted.

o Doubled consonant: fell/feel, thiss/this, babby/baby, watter/water, untill/until.

o "Silent" letters written: where/were, whill/will, whith/with.

o "Silent" letters not used: wen/when, witr/whiter, clim/climb, noking/knocking, bilding/building.

o ch for tch: cech/catch, waching/watching, haching/hatching.

o c or kc for ck: pic/pick, sic/sick, blakc/black.

o ck for k: bicke/bike, licke/like, drck/dark.

o Phonetic substitutions for "ed" or "es" sound: cilde/killed, rande/rained, chast/chased, slipt/slipped, appls/apples, leavs/leaves.

o Error on "drop e when adding -ing" rule: comeing/coming, danceing/dancing, takeing/taking.

o Substitution of r for er and l for e: campr/camper, latr/latter, watr/water, appls/apples, pepl/people, bumbl/bumble.

o Homophones: by/buy, no/know, won/one, to/two, four/for.

In summary, these are samples of the major ways words can be misspelled yet retain a strong phonetic or "sound alike" similarity to the target words. The list is not meant to be definitive. Too, the rules presented for determining a good phonetic equivalent may find some disagreement.

Since in English there are a number of ways a given sound may be represented in print, good phonetic equivalents generally indicate that the student has a firm grasp of reasonable, logical alternative ways to write sounds. Errors of these kinds should be quite common in the writing of the greater majority of students.

Language Development and Specificity

Wigg and Semel (1976, 1980), specialists in children with language-based learning problems, have identified several types of reading and spelling error patterns common to these pupils. These authors believe that language processing problems and those in reading and spelling go hand-in-hand. Cited in support of this position are such statements as:

> Measures of linguistic abilities (such a knowledge of word meanings, facility with sentence structure, understanding parts of speech, or recognizing what is ungrammatical) relate most closely to measures of reading comprehension, and deficits in language processing may be associated with reductions in reading comprehension ... word substitution errors in reading, writing, and verbal recall tend to be somewhat predictable (1976, pp. 15, 19).

The clusters of errors listed below may occur in speaking, reading, spelling or combinations of these activities.

Sound Discrimination Errors:

o Initial consonants: (1) voiced vs unvoiced such as b/p (bad/pad), d/t (dime/time), g/k (got/cot), v/f (vat/fat), z/s (zoom/soon); (2) back vs front articulation such as th (ether)/ th (either), g/d (got/dot), z/b,v (zip/bip,vip).

o Consonant blends: (1) l, w, or r in the second position such as pr/pl (pray/play), fr/fl (frat/flat), kr/kl (crock/clock), tr/tw (train/twain); (2) -r blends such as pr/tr/kr/dr/gr/fr (pray/tray, drip/grip, from/drum, etc.); (3) -l blends such as cl/pl/bl/gl/fl (glad/clad, black/plack, flip/clip, etc.).

o Consonant blends as single sounds: rain/train, rip/trip, lip/flip, am/clam, rut/rust, bet/bent, sit/sift.

o "s" sound in triple blends causes confusion with following consonants: slit,spit,sit/split, scheme,seam/scream, slide/side, spoke/soak, slit,split/sit.

o Consonant blends initial "s" sound: substitutions of sp/st/ sk/sm/sn/sl/sw typically as sp/st,sk (spin/skin), sp/sm (spell/ smell), and st/sl (strip/slip).

** Severity index: (1) When consonant confusions cause meaning changes (The rain is gone/The pain is gone, Money in your pocket/ Money in your socket); (2) When the consonants confused are quite dissimilar (highly similar: v&f, d&t; moderately similar: g&z, k&j; highly dissimilar: g&s, n&v, z&t).

o "Front" vowels most problematic: bit/bet/bat, pin/pen/pan; short vowel discrimination problems are at the heart of vowel problem reading, spelling and speaking errors.

o Difficulties learning varient spellings or pronunciations: play, neighbor, race, great; bear, ear, Easter, great; berth, earth, birth, worth.

o Close sounding vowel-consonant blends:writton/written, cottin/cotton, teachor/teacher.

Meaning Errors:

o Verbs describing complex actions: balancing/bouncing, crawling/crouching, leaping/evading, passing/punching, tumbling/twisting, swaying/swinging.

o Adjective substitutions: big/large, blue/black, thin/narrow, young/new, sweet/sour, rough/hard, sad/angry, far/distant, bigger/nearer, hottest/hotter, shorter/shortest.

o Adverb substitutions: (1) derived from -ly such as quietly/quickly, suddenly/slowly, daily/dally; (2) indefinite adverbs such as somewhere/someplace, anywhere/anytime.

o Locative, directional, temporal prepositions: in/on, below/beside, next to/by, behind/between, under/around, off/of, down/away, into/to, Tuesday/Thursday, from/around, at/on, before/between, for/form.

o Pronoun confusions: (personal) he/she, we/they, he/him, we/us, they/them; (demonstrative) this/these, those/that; (indefinite, negative) anyone/anything, any/some, someone/something, somebody/anybody/nobody, nobody/nothing, nothing/no one.

o Imperception of suffixes such as -er, -ly, -y: sing/singer, teach/teacher, happy/happily, wind/windy, slow/slowly, tie/untie.

o Suffix substitution: happily/happier/happiness, beginner/beginning, climbing/climber, recover/recovery, shopper/shopping, motioning/motionless.

o Confusion between prefixes: prepare/repair, underpowered/unpowered, uncover/discover/recover, propare/prepare, comtact/contact, enbassy/embassy.

Word Formation Errors:

o Noun plurals and possessives: boyses/boys, catses/cats, dressesses/dresses, nose/noses, nurse/nurses, foots/feet, mouses/mice, boy/boy's, nurse/nurse's.

o Third person singular of verbs: go/goes, come/came, eat/eats, take/took, walks/walk, likes/like.

o Verb tenses: walkded/walked, sleeped/slept, sobbed/sobed, runned/ran, ringed/ring, thinked/think, take/took, do/did, am/will, been/were, builded/built, been/has been, gonna, have, were/has been.

Word Finding Errors:

o Word discrimination, similar sound sequences: bring/ring, driving/diving, cashing/crashing, grass/glass, them/then, much/mush, spell/sell, send/bend,lend, smelling/smiling, growing/groaning.

o Sound substitutions: blue/brown, sing/sting, television/ telephone, bought/brought.

o Semantic substitutions: bannana/orange, tiger/lion, pen/ pencil, spoon/fork.

o Opposition: hot/cold, brother/sister, day/night, large/small.

o Overuse, imprecise: made/baked, built, drew, sewed; put/ mixed, tied, planted, dropped.

o Prefix and suffix substitutions: discovered/uncovered, kindness/kindly, propollution/antipollution.

o Homonym substitutions: air/heir, heat/heet, cell/sell, dear/deer, die/dye, feet/feat, hear/here, lie/lye, mail/male, tail/tale, wait/weight, roll/role.

Frith (1980) reported on the spelling errors of school-aged children with receptive language problems. His sorting of the errors revealed that the children tended to make repeated patterns of errors, as illustrated below:

o Phono-graphically similar (both look and sound alike in several ways): alone/along, boles/balls, baak/back, caim/came, caridg/carriage, complane/complain, cud/could, doan/down, dust/just, gom/come, gett/get, hourse/horse, littl/little, mongky/monkey, pult/put, thut/thought, wan/when, woted/wanted.

o Vowel substitutions: an/in, ap/up, beg/big, caw/cow, full, fall/fell, got/get, se/so, sew/saw, pack/pick, ther/this, tirid/tired, wake/woke.

o Letter omissions: agan/again, an/and, for/four, com/came, cat/cart, came/camel, frend/friend, gon/gone, is/his, nice/nicer, now/know, quck/quack, son/soon, the/then, thee/three, to/top.

o Phono-graphically distant: a/up, anoy/another, agry/angry,

dolic/balls, happe/help, many/monkey, the/that, we/when.

o Syllable omissions or transpositions: cinder/cylinder, long/along, rembered/remembered, suddley/suddenly, mines/minutes, amanals/animals, molar/moral.

o Visual errors: eeg/egg, enougth/enough, finth/fight, fired/friend, it/in, nok/know, wife/wire, soms/some.

o Morphological errors: founded/found, laughted/laughed, slowlyer/slower, frighted/frightened.

o Spelling rule errors: bigr/bigger, bravly/bravely, fliing/flying, geting/getting, storys/stories, ploded/plodded, bite/bit, duke/duck, hom/home, tak/take, chas/chase, acros/across, animall/animal, tigger/tiger, arnt/aren't, foxes/fox's, have'nt/haven't, a cross/across, in to/into, a way/away, alright/all right.

In summary, reading and spelling errors may be strongly related to general language development. The details of this relationship are not yet known. Even so, the error profiles presented may assist in isolating persistent difficulties with English for certain students.

In addition, Wigg and Semel present some unique problem areas not typically described in discussions of reading and spelling. In so doing a special contribution to educational practice has been made: The broader interpretation of mistakes in reading and spelling as related to minor or major difficulties with Standard English as a whole.

MISCUE ANALYSIS AND THE ROLE OF CONTEXT

When children read or spell a list of words, whether given as a spelling test, for flash card practice, or as a quick way to judge student skill level, the format is "artificial". That is, the purpose of learning to read and spell is effective communication, and this occurs in reading text in books or in writing paragraphs on topics.

Word Recognition is Improved in Context

Over twenty years ago Goodman (1968) discovered that children could improve their ability to sound out words read in a list when the same words were presented in the context of a story. For example, first graders corrected two-thirds and third graders corrected four-fifths of their list errors.

This finding has been replicated since. MacMullin's (1980) study was one. Results showed that second grade children correctly recognized fewer words in isolation than in the context of oral reading selections. Nicholson, Lillas, and Rzoska's (1988) study was another. These authors showed that both 6 and 8 year old poor readers made 52% gains in reading accuracy with words in the context of a sentence versus isolated in a list.

Interestingly, the 8 year old good readers made about an equal number number of errors in both situations. Apparently their better developed word analysis skills helped them overcome the loss of available cues in the list situation.

This observation supports Stanovich's (1986) contention that the ability to rapidly and automatically utilize look and sound cues (i.e., graphophonetic) is a central element in reading progress.

There is general agreement that in reading isolated words students rely heavily on letter-sound cues. As a result this type of reading likely measures the student's application of phonics knowledge mostly unaided by other cues.

"Since it is almost universally accepted that context influences word choice and miscues (reading errors in context) ... lists of words cannot reveal the same error tendencies as does contextual reading" (Spache, 1981, p. 150).

This is the case since so much more information for word analysis is available to the student from the paragraph: Syntactic, semantic, and orthographic cues especially -- in actual use. The following kinds of information would not be available when reviewing list reading errors:

o Sentence meaning retained: I will hose the car today/ I will wash the car today.

o Word is of same part of speech: The dog ran wildly/ The dog ran mildy.

o One error is changed to agree with another: Mother's looking/ Mother looked.

o Word sequences are maintained: I will go get lunch/I will get lunch.

o Pattern of graphic or phonic matches are maintained: Went to fast/Want to fly.

o A grammatically correct sentence results: The young boy ran/ The boy ran.

Individual Differences

As Clay (1977) has pointed out, any of these results can vary with reading level. For example, Clay reported that second graders of three reading levels made these proportions of syntactic, semantic and graphophonetic substitution errors:

	Grammatically Acceptable	Error Acceptable Within Meaning of story	Beginning Letters the Same	Ending Letters the Same
Good	80%	80%	80%	53%
Average	70%	65%	80%	53%
Poor	62&	54%	80%	53%

Even though the good and poor readers utilized first and last letters equally, other aspects of their errors revealed better use of graphic information for the good readers, as for example:

Good	Poor
ready/read	pet/paint
captain/cabin	father/first
toys/boys	great/cart
Africa/afraid	so/sore
yatch/yacht	read/paint

Some Questions to Ask

Based on the material presented so far, any error patterns or types made by a student would likely be more informative if the context in which they were made were known. Henderson (1981) suggests that any reading or spelling substitution error would be better understood if the following question were asked:

(1) Does the error look like the word in the text?

(2) Does the error sound like the word in the text?

(3) Is the error the same part of speech?

(4) Is the sentence containing the error grammatically accpetable?

(5) Is the sentence containing the error a meaningful English sentence?

(6) Does the sentence containing the error change the intended meaning of the author?

To help with the first two questions Goodman (1969) devised these rating scales:

Graphic Similarity	Phonic Similarity
0 no similarity	0 no similarity
1 zoom/cook	1 was/saw
2 helped/moved	2 kite/cap
3 perceive/perhaps	3 pets/puppies
4 went/wanted	4 quietly/quickly
5 pets/puppies	5 unusual/unusually
6 quickly/quietly	6 miss/Mrs.
7 saw/was	7 grow/grew
8 batter/butter	8 wint/went
9 read/read (homographs)	9 two/too (homophones)

Use of these guidelines can help in rating graphic or phonic similarity generally as high, medium, or low. In addition to these two scales Goodman has devised an extensive system for rating other kinds of miscues. A discussion may be found in Spache, 1981, pp. 135-142.

Critical Reviews

Both Wixon (1979) and Leu (1982) have compiled research summaries on the topic of miscues and reading errors generally. Several important conclusions from these reviews are as follows:

(1) There exists a wide range of definitions or labels for types of errors, as promoted by different authors. Different errors can have similar labels, and similar errors can have different labels.

(2) Reading a too difficult passage probably forces the student to over use graphic or phonics information.

(3) Errors can have multiple sources as suggested by the example: Katie reached up and touched the top of the pole/Katie reached up and touched the tip of the pole. This error has graphic similarity, phonic similarity, and is syntactically and semantically acceptable.

(4) Students consistently tend to produce more miscues that are contextually acceptable (fit grammar and meaning) than graphophonetically similar (fit look and sound) to the original text.

(5) Most miscues tend to be more syntactically acceptable than semantically acceptable. We should expect readers of all ages to produce large percentages of grammatically acceptable errors.

(6) The percentage of graphophonetically similar miscues increases through the early grades. This is due to the effects of specific training of students on how to "sound out" and "look carefully at" words.

Lastly, "an analysis of the miscues generated by a particular reader under a variety of conditions may reveal any pervasive problems the reader may have as well as the particular conditions which present the reader with the greatest difficulty " (Wixon, 1979, p. 172).

Self Correction

Wixon has also noted that there is a distinct trend of individual student differences in tendencies to self correct reading errors. Specifically, less able readers tend to make fewer correction attempts, tend to correct a smaller percentage of miscues than do good readers. Also, good readers "have a greater awareness of which miscues interfere with meaning and therefore require correction" (p. 161).

Additionally, grammatically unacceptable errors are corrected at higher rates by the good readers (example: first grade good readers self corrected 85% of their grammatically unacceptable miscues, versus 42% for poor readers).

Clay (1977), too, has addressed this topic. She pointed out that there are a variety of cues that may prompt a reader that an error has been made:

o The response does not make sense -- in the sentence, story, or compared to pictures.

o The response makes sense, but the way the target word looks is incongruous with the given response.

o The response given "does not sound right" compared to what the student knows about how the word seen should sound.

o The student senses "something is wrong" as judged by signs of dissatisfaction with the response: A puzzled look, a complaint, a hesitation, a repetition of the word, something said ("It's too long"), or an obvious look through the text.

Whatever the reason, children often self correct their own errors. Typically children who think an error has been made go back to the beginning of the line, or re-read the problem word. These students are often successful on the second or third trial. Clay had termed this "the courage to make mistakes, the 'ear' to recognize that an error has been made, and the patience to search ..." (p. 119).

Two keys are suggested by this statement:

Key 1: The student is aware that something is wrong -- it is crucial that awareness of the error is present; it may not be.

Key 2: The student is self-motivated to attempt a correction -- adult help can be given, but children need to learn to do this on their own.

Children need to learn and use error correction techniques: To establish a "smooth predict-and-check procedure", to cross-check reading and spelling errors using the variety of cues (meaning, grammar, look and sound similarity, spelling rules).

Clay, among others, has pointed out that not all students are efficient in this process. For example, she found that self correction occurred spontaneously only in 26% of over ten thousand errors collected from seven and eight year-old students. While pupils of all levels of reading skill used self correction, when all students were divided by four levels of skill in reading, the following ratios of self correction were evident:

- o Above average readers: 1 in 3 errors.
- o Average readers: 1 in 4 errors.
- o Below average readers: 1 in 8 errors.
- o Very below average readers: 1 in 20 errors.

Cohn and D'Alessandro's (1978) report adds further insight to the role of self correction in reading errors. These authors studied children seven to seventeen, all of whom were students with reading difficulties.

They observed what occurred when these students were simply asked to, "Please look at it carefully, and try it again". If this request did not produce successful decoding, the students were then asked further questions such as, "What are the first two letters?", "What sound do they make?", and so forth.

Cohn and D'Alessandro discovered that 50% of the words originally missed were corrected on the first re-try, and an additional 29% on the second. Some examples given were:

Printed Word	First Try	Second Try
photograph	program	photograph
elephant	first in hand	elephant
championship	chapperwishing	championship
circumstances	customistic	circumstances
ground	rugged	ground
broadcast	blackbird	broadcast

These data suggest that something other than inefficient decoding skills was involved in the reading errors. Some possibilities might be: (a) the students may habitually decode only a little of the word; (b) the students may answer too quickly; (c) the students have not yet learned the value of self correction attempts.

DEVELOPMENTAL SPELLING

Bissex (1980, p. 199) observed of her son Paul:

> When he was five and a half years old, Paul wrote and posted this sign over his workbench-desk: DO NAT DSTRB GNYS AT WRK ... The GNYS (genius) at work is our human capacity for language. DO NAT DSTRB is a caution to observe how it works ... the logic by which children learn.

Charles Read and Invented Spelling

Interest in the developmental aspects of children's spelling began with the observations of Read (1975). Read studied the patterns of spelling errors made by children 2½ to 8 years old. Their spelling was called "invented" since it was what they wrote before formal school instruction. Review of these invented spellings is thus able to reveal natural, normal developmental patterns: Types of ways children transfer their already developed language skills (listening and speaking) to written form, independent of the particular conventions of Standard English.

Before formal schooling begins children already recognize the phones or individual sounds of English, and can make many specific and subtle judgments about them. For example, pre-school children can discriminate sounds like t (tip), s (sip), and z (zip), and can pick out s and z as most similar.

To write words, then, it only remains to figure out how to represent in print the known sounds and sound patterns. Read found that young children utilized a unique system, of which methods chosen by large numbers are illustrated as follows:

(1) Vowels. Children typically represented vowels by using single letters, and used only the five single vowels. Thus the sixteen English vowel and vowel combination sounds were represented by only five symbols.

o u sound (glue) using w: kostwn/costume, pllwl/pool, spwn/spoon.

o e sound (be) using y: crym/cream, my/me, wyc/week, esyr/easier, gryn/green, byfr/before, shy/she, syt/seat.

o Long vowels were often used correctly as "letter names": A as fas/face, da/day, nachr/nature; E as egle/eagle, fel/feel, brefcas/briefcase; I as tigr/tiger, mi/my, tim/time; O as gowt/goat, poleow/polio, kok/coke; U as junur/junior, humin/human, fabuare/February.

o Long vowels were substituted for short vowels when the long vowel (letter name) sound was "close to" the short vowel sound: bat/bet, set/sit, cit//cot, hot/hut, tu/too.

o i sound (it) using e: sep/ship, fes/fish, sek/sink, wel/will, pel/pill, hemm/him, doeg/doing.

o e sound (bed) using a: pan/pen, bat/bet, fall/fell, lafft/left, mas/mess, alls/else, prtand/pretend, ane/any, shalf/shelf.

o aw sound (saw) using i: git/got, clic/clock, bics/box, ir/are, upin/upon, hirt/heart, pips/pops.

o e sound (be) using i: rile/really, filg/feeling, sike/seek, clin/clean, uslip/asleep, shi/she.

o a sound (table) using e: jen/Jane, bec/bake, et/ate, pley/play, tode/today, tec/take, plear/player.

o ie sound (tie) using a, ai, aiy, ay: naiys/nice, mai/my, may/my, hay/high, ray/right, nat/night.

o o sound (nose) using o: bot/boat, hop/hope, rod/road, ond/owned, uwokin/awoken.

o u sound (up) using a, e, i, o: benane/banana, becoz/because, plemeth/plymouth, uklok/o'clock, watid/wanted, opon/upon, cerit/carrot, igan/again, icspans/expense, minets/minutes, nosis/noses, rocit/rocket, dafadils/daffodils, opisitt/opposite, licwid/liquid, srcis/circus, noulich/knowledge.

o u (up) sound omitted, a frequent spelling: raltivis/relatives, platd/planted, brayslit/bracelet.

o Omission of a vowel when the syllable has a vowel-like consonant (a "syllable without a vowel"): brd/bird, sistr/sister, opn/open, Adm/Adam, frm/from, evn/even, kitn/kitten, line/lion, iden/indian, sodnly/suddenly, satns/sentence.

o Omission of unstressed sounds: latr/letter, litl/little, wotr/water, satrdy/saturday, watd/waited.

One result of attempting to represent a variety of vowel sounds using primarily single letter spellings, rather than distinctive vowel combinations, is a considerable degree of homography: Many sounds represented by single letters. For example, young children can write the sounds bat, bet, and bait all as bat.

Children tolerate this and do not find it unusual. For them, it seems the best spelling is one which maintains a one-to-one correspondence between sounds and their written counterparts. Since written English does not, often, maintain this one-to-one relationship, young children's writing can be difficult to read.

(2) Consonants. These, like vowels, are represented in many non-standard ways. None indicate perceptual problems, rather

all have logical explanations. High frequency examples are:

o tr using chr: chribles/troubles, chrie/try, cwnchre/country, chrac/truck, chac/track, chrain/train.

o Omission of pre-consonant nasals (n, m, ng), usually when they precede sounds like p, k, f: thaq/thank, blaket/blanket, bopy/bumpy, numbrs/numbers, attept/attempt, grapo/grandpa, staps/stamps, mostr/monster, plat/plant, ad/and, cat/can't, thekce/thinks, agre/angry, sek/sink, hacc/Hanks.

o d for t: prede/pretty, ladr/letter, bodom/bottom, aodov/out of, ade/eighty, woodr/water, nodesen/noticing, bedr/better, ridn/writing, adsavin/eighty-seven, gadichans/get a chance.

o t for d: nobtiee/nobody, pebate/Peabody, mitl/middle.

o Past tense -ed with d, t, or id: lafft/left, halpt/helped, swoupt/swooped, gast/guessed, likt/liked, cold/called, stad/stayed, addid/added, watd/waited, wotid/wanted, hatid/hated.

o Past tense t sound with d: fixd/fixed, walkd/walked, finishd/finished, lookd/looked, pekd/peeked.

o z sound (is) with z: iz/is, diz/does, waz/was, becoz/because, owsenz/oceans.

o Other invented spellings of z sound: ec/is, raisic/races, tetcherc/teachers, irss/ears, sise/size, soo/zoo, cose/cows, sase/says, ise/eyes, hes/his, towse/toes, pos/paws, hawuls/howls.

These examples provide ample support for the belief that young children have a knowledge of the English language sound system, and this allows them to systematically represent these sounds in print.

Their non-standard spellings are, thus, "errors" only in the sense that they are not common practice, not Standard English.

There are reasons why children who have not yet received formal instruction spell as they do (Beers & Beers, 1981; Read, 1975). First, these children often rely on the place of articulation of the word in the mouth. If the word heard and the word written "feel" similar, they are considered the same. Try this exercise: mod/mud, hez/his, alvs/elves.

Second, as in the above example, the name of the alphabet letter is closely matched to the sound the student wishes to spell. Letter names are heavily relied upon in spelling, yet only a few words can be correctly spelled using this "sounding" strategy.

Third, while children do hear certain sounds in words to be spelled, if these sounds regularly occur in speech, children

apparently do not feel compelled to write them. For example, the m sound can regularly only be found before the p sound at the end of a word, likewise the n sound before the t sound. These facts result in such substitutions as attapt/attempt, cat/can't, jupr/jumper.

Fourth, young children do not use known, related words to help spell unknown words: No relate in the error reltivis, no office in the error afishill, no opposite in the error opisitt.

Fifth, some invented spellings seem more phonetically accurate than actual spellings: bodom/bottom, ladr/letter, brayslit/bracelet.

Sixth, as Zutell (1979) has pointed out, a developmental sequence is evident in the spelling errors of young children. This may be strongly related to the fact that these children tend to "center" on spellings based on a word's sound. In just the same way do they "center" on the water level difference between a tall, thin tube of water and a short, wide tube of water when actually both tubes contain the same amount. Young children commonly say, based on the "look", that the amount of water is greater in the tall tube.

Developmental Sequences in Spelling

Following Read other researchers have systematically analyzed a variety of invented spellings. As a result of the scrutiny developmental stages became evident (Beers & Beers, 1981; Bookman, 1984; Gentry, 1984). Although these stages have been given different names, and the number of stages has varied in different reports, a typical sequence is as follows:

Stage 1: Preliterate or precommunicative spelling is characterized by letters randomly strung together. Words, as such, do not yet exist. Letters have no relationship to sound. Numbers, letters, and other signs may be mixed.

Examples: ABDG/Wally, 11+OZ/cat, BZA6/?, opspo/eagle, RTAT/eight.

Stage 2: Semiphonetic spelling is characterized by letters that represent sounds. Since now letters stand for sounds, the alphabet code has been broken. However, at this stage only some sounds are represented. Typically these are consonant sounds, commonly the first and last letters. Examples:

o Beginning letters followed by random letters: SV/sat, B/baby, WTBO/Wally, DIJ/dog, Wnw/will.

o First or last letters correct, some other letters used: GT/get, EGAR/edge, KT/cat, hm/home, nowt/must, bt/bit, wow/will, s/Cinderella, srpeigel/surprise, MTR/monster, UT/united.

o Incomplete representation: vis/advice, res/reach, nt/enter, spis/surprise.

Stage 3: "Letter name" spelling is characterized by (a) substitution of a letter name for a sound-part in a word, (b) substitution of a letter name (i.e., long vowel) for a short vowel based on similarity of articulation -- it's close enough in the child's judgment, (c) omission of some consonants that are not "felt" by the mouth in articulation, (d) omission of vowels when the consonant "sounds" the vowel, and (e) increasing correct use of consonants and long vowels. Some examples are:

o Letter name (long vowel) substituted for a short vowel: pan/pen, et/it, dij/dog, bet/bit, sedrli/cinderella, gat/get, trep/trip, bat/bet, fet/fit, mod/mud, troble/trouble, stel/still, nakst/next, alvs/elves, kit/cut, jro/draw, wel/will, hem/him, ded/did, git/got, most/must.

o Omission of vowel when consonant "sounds" it, before r and l: bedr/bitter, frmr/farmer, map/maple, dodl/doodle, acl/ankle, butrfli/butterfly, ovr/over, revr/river, tabl/table, flpt/flopped, frm/farm, mothr/mother, fird/fired, elevatr/elevator.

o Omission of pre-consonant "nasals": wat/went, kade/candy, wetr/winter, cids/kinds, jupt/jumped, cat/can't, attapt/attempt,

tat/tent, frad/friend, dot/don't, wed/wind, thig/think, ad/and.

o Letter name: lephant/elephant, y/why, b/bee, q/you, ynt/went, ppl/people, egl/eagle, xplan/explain, yel/will, bgan/began.

Stage 4: Phonetic spelling is characterized by letters or letter combinations which represent all the sounds in a word, and in the correct order. Some of these spellings may be correct, some may be "unconventional", but all are written like they sound. Here are some examples of spelling at this stage:

o "Exact" phonetic renditions: tiur/tire, youse/use, lic/like, wuz/was, hav/have, liv/live, pritte/pretty, tucht/touched, tickl/tickle, dreem/dream, abowt/about, hows/house, snal/snail, cabig/cabbage, moov/move, shal/shell, uthers/other's, diyde/died, ov/of, shuse/shoes, purd/purred, ag/edge.

o "Close" phonetic renditions: waer/wear, ckard/cared, trobel/trouble, lessen/lesson (schwa substitution), aeouppl/apple, rder/order, parches/purchase.

o "Letter name" phonetic: ate/eighty, tip/type, slim/slime, crep/creep, rakt/raked, mak/make, sno/snow, rgu/argue, xprs/express, lit/light, gron/grown, rech/reach, tech/teach, mane/many, net/neet.

o Elongation or "glide" on vowels: boe/boy, gow/go, mee/me, tiy/tie, criy/cry.

o Letters m, n, r, or l used for a syllable: entr/enter, mitn/mitten, lidl/little, ritn/written, drsr/dresser, writn/written, peepl/people.

o Homophone exchange: lode/load, seas/sees, lite/light, loan/lone, sail/sale, feet/feat, site/sight.

Stage 5: Transitional spelling is characterized by (a) "good" phonetic spelling, (b) visual memory of spelling patterns (especially seen in recall of non-phonetic words), (c) increasing use of conventions or spelling rules, and (d) the addition of appropriate short vowel and vowel combination (i.e., vowel blend) use.

At this stage children are moving away from a direct letter-to-sound matching strategy, and towards greater use of memorized spelling patterns (like prefixes and suffixes), rules, and analogies (Chomsky, 1970; Henderson, 1980). Examples are:

o Use of analogies: sailor from sail, financial from finance, initially from initial, national from nation, criticize from critical, factual from fact, revision from revise, resign from sign, majority from major, width from wide, soften from soft, racial from race.

o Remembered patterns (visual memory): sail, feat, lone, site,

occurring, finally, saved, slowly, sleeping.

o Beginning spelling rule use: gaett/gate, maik/make, ridder/rider, nachure/nature, eightee/eighty.

Gentry and Henderson (1980) have illustrated the difference between stages 4 and 5 like this:

Phonetic/ Letter Name	Transitional	Correct
mostr	monstor	monster
ate	eigty	eighty
hikt	hicked	hiked
luvatr	aeluvater	elevator
egl	eggle	eagle
unidid	younieted	united

In summary, several researchers have identified a developmental sequence of learning to spell. The stages presented here are composites of those described. Of course, students would not likely fall "neatly" into a particular stage pattern at any given time. Instead students would be more apt to show, in their work samples, characteristics of the stages just before and just after that stage which seems most characteristic. Indeed, these developmental sequences are presented just to outline general trends in spelling skill development, during which children's substitution errors are generally predictable.

Lastly, and as a point of reference, it needs to be mentioned that the end result of learning to spell is to spell the right way. And so there is ...

Stage 6: Correct spelling is characterized by appropriate use of a variety of spelling cues. Reflection on the spelling difficulties given by the following words will indicate that this is a considerable achievement:

o Correct spelling: type, eagle, united, monster, raked, wading, flopped, cheated, skid, craft, scared, bait, sleeping, smattering.

THE SKILL BASED APPROACH

"Examination of a sample of errors in reading or spelling reveals patterns from which teachers can derive hypotheses about children's learning strategies for a particular task. For the child, errors are a natural and important part of learning; for the teacher, errors provide important information" (Ganschow, 1981, p. 686).

Reading and spelling mistakes highlight two essential ingredients in teaching: How effective the teaching has been, and what else needs to be taught. Utilizing student errors as aides to instruction can be done in three ways.

First, errors can be corrected "on the spot", as needs be, and as they "pop up".

Second, errors can be understood as related to certain kinds of student-centered problems, like "poor memory", "lack of application", "learning disability", "limited aptitude", or "immaturity". These problems may be addressed in teaching.

Third, errors can be viewed as reading and spelling mistakes that, when grouped together into patterns, can indicate particular, pervasive need areas that require instructional emphasis.

It is this third option that seems most suited for general use, and most likely to have a direct impact on student learning. The first method only addresses individual errors, and so does not directly produce learning which will prevent the "kind" of error in the future. The second method requires the teacher to hypothesize about internal states, and these cannot be observed directly, and so their characteristics remain vague, or are turned over to "specialists".

The question is, How can student errors be most practcially grouped or categorized? There are three basic possibilities.

Three Ways to Utilize Error Patterns

First way. A selection from the variety of error "labels" as presented so far can be chosen. Those that seem most useful for a particular purpose, or those that seem to fit best with a teaching need are used. Some may seem to have more value than others, from one time to another.

Second way. A more or less general format can be worked out whereby broad error trends are delineated. These can then be used as guides for what to do next, or for understanding the nature of the student's reading or spelling problem. Details within a trend can be pinpointed for individual students.

Third way. The technique of "error pattern analysis" can be

used. This amounts to (a) collecting a sample of student errors, (b) judging the likely remedial need each indicates, (c) observing the trends or "fall together" of these judgments, and, if desired, (d) double checking on their accuracy by follow-up diagnostic testing.

The First Option is Practical

An array of error patterns have been detailed in this report, in terms of what students do, and from which a selection can be made. These error patterns were referenced for this purpose.

Different teachers likely would feel more comfortable with, and believe more benefit could be derived from, certain error configurations than others. In some circumstances this would be indeed true: One selection would be much more likely to guide further instruction than another, would be more informative.

Because student skill development and teaching needs can vary considerably from one time and place, no "general purpose" recommendation is possible. The key to selection is: Choose what you need, change your choice if you need.

The error types presented are not speculations or theories, they are observations of what some students actually have done when asked to read or spell. Consequently, they are error types that do occur in reality, and will continue to occur. Hence, they are useful as aides in "what to look for", especially insofar as a teacher has a need for guides to what profiles of errors would be helpful for instruction.

Of course, the main problems with this approach are that, probably, too many kinds of errors are in the pool to choose from, and secondly, the patterns are figured out as useful before the student actually makes them. For example, some, or many, actual errors may not "fit" the categories chosen.

This situation can be confusing since it involves keeping in mind a relatively large number of patterns to look for. As well, useful kinds of errors may be overlooked since they are not of the kinds searched for or considered important.

All in all, though, this method does have some value, particularly as it allows individual freedom to choose those errors that are meaningful and relevant for a purpose. Knowledge of the variety of errors possible ought to be of great assistance in this regard.

The Second Option is Practical

This is so since it reduces the need to keep in mind a large number of types or patterns. Two examples of this approach are given, for spelling. First, Marino (1981) has usefully grouped

spelling errors into six patterns, which are:

Pattern A: "Wuts there was a strag jragin hou had a elefet. Wun day the jragin sad my elefet fels sik. Plez sad the diktr. I wil wat yl the diktr is coming in his chruk".

Tip-offs that this student is using "invented spelling" are given by: (a) letter name strategy (fels/feels, yl/while), (b) omission of nasals before consonants (wuts/once, elefet/elephant), (c) substitutions based on sound formed in the same place in the mouth (chruck/truck). These spelling errors are mostly developmental in nature. They would be rare after second grade or so for normal achieving students.

Pattern B: "Meny people think that jist becuse there smart they shuld be first in line. I no I'm not too smart, but I'm just as hungry as the next person".

This type of student has mislearned many common, high frequency words. We remember that 100 words account for two-thirds of all words written by children.

Pattern C: "I have been studing your college programes and cannot find a date when you will be admiting students for next year. I am planing to graduate in June and am hoping you will be sending out letteres soon".

The misspellings here indicate problems with regular spelling rules (dropping y when adding -ing, consonant doubling, forming purals).

Pattern D: "Where Is Miss Nelson is a fantastik book for children. It is about a couragous teacher and a dumm detectiv. When the kids wuldn't be qwiet, Miss Nelson changed from a lovely teacher to a mean wich".

These kinds of spelling errors indicate problems with common patterns, like -ick, -eous, -mb, -ive, qu-, -ely. The student has not understood that in English some letter patterns are more common, more predictable than others.

Pattern E: "This is a story about a infemous megishun who had the distinkshun of living in the oldest manshun in town. He and his pienist put on musical producshuns and resatations around town".

These kinds of spelling errors relate to lack of analogy use (magic is in magician, distinct is in distinction, piano is in pianist). This student is not effectively using root words and word relationships.

Pattern F: "You may recieve your new dictionary by reporting to the stationary departmant near the Fushia Room parallel to

the Green Room. The superintendant and the princaple will be waiting for you there".

Here is a student who has not memorized some irregular spellings. Even good spellers find some words troublesome and are helped by memory aides.

Pattern G: "When the conquistadore stormed the barricade with an army of soldiers, this manuver was rewarded by the emperor. Unfortunately, the conquistadore died of a hemorage a week later".

The student who can misspell words like conquistador or hemorrhage, but who has little trouble with most words in the age appropriate basic vocabulary, needs to learn proof reading skills.

These examples illustrate that spelling errors can occur for a variety of reasons. By considering the qualities of the errors (versus how many are made), the patterns of the problem can be revealed: Use of non-standard but developmentally logical strategies; problems with irregular, high frequency words; with conventional spelling rules and regularities; with the need for personal memory aides; or a need to develop a spelling conscience, to proof read carefully.

Shaugnessy (1982) has related a similar list of general tendencies. These are:

(1) Misspellings caused by unpredictabilities within English spelling. The student needs to learn the correct spelling of the "demons", and to keep homophones straight. Students who find this difficult often produce misspellings which would not even occur to average students as options, and which good spellers could not even imagine making:

o Same unit spelled a variety of ways: explosun/explosion, decisien/decision, directen/direction, conditing/condition, educatanal/educational.

o Same word spelled differently: benefitial, benefical, benefishal.

o Simplifies written options: delicaces (e for ie), easer (i omitted), deciving (i for ei), eather (ea for ei), extream (final e omitted), unresonable (e for ea).

o Idiosyncratic form of "basic" spelling: biggut/bigot, bott/bought, broden/broaden, delt/dealt, falts/faults, hier/hire, honist/honest, offen/often, romed/roamed, swich/switch, takn/taken, truble/trouble, wot/what, wreckonession/recognition.

(2) Misspellings caused by pronunciation. These kinds of errors

reflect non-standard articulations of words, and may have regional or ethnic sources. These students are "at a double disadvantage" as spellers since they must both deal with the irregularities of English and their own irregular ways of saying words. There are many reading and spelling errors that may be attributed to dialect, and these closely represent the student's spoken English:

o Dropped endings: anothe/another, daught/daughter, moth/mother, wheneve/whenever.

o Ending consonant clusters reduced: attrac/attract, fine/find, contac/contact, curren/current, perhap/perhaps, dept/depth, migrat/migrant.

o Confused sounds: (d-t) altitute/altitude, badle/battle, medal/metal, bandid/bandit, presidend/president; (m-n) conparing/comparing, disconfort/discomfort, comtrol/control, blaned/blamed; (f-v) believes/beliefs, releave/relief, savely/safely, strive/strife; (b-d) decome/become, goob/good, buring/during, biploma/diploma.

o Close sounding prefixes confused: entellect/intellect, intertain/entertain, proform/perform, presist/persist, prehaps/perhaps.

o Substitution of i for e sound: pin/pen, pinny/penny, bear/beer.

o Omission of r or l: god/guard, hep/help.

(3) Misspellings caused by homophone confusions, which are predictable only in context: do/due, here/hear, know/no, through/threw, won/one, you're/your.

(4) Misspellings caused by unfamilarity with the structure of words. These problems relate to how words change tense (walk to walked), number (walk walks), degree (slow to slower), class (courage to courageous), or meaning (help to helpless). Some examples are:

o Superfluous syllable: availiable/available, emphesises/emphasis, ansewer/answer, jellious/jealous, simiple/simple.

o Omitted syllable: crated/created, finncal/financial, motvation/motivation, surban/suburban, clerial/clerical, imblance/imbalance, parell/parallel, consired/considered, inaccute/inaccurate, stugged/struggled.

o Variations for same word: prejudeicied, prejeduce, prejusticed, prejudiced, prejudgiced.

o Elimination of diacritical "e" between consonants:

advancment/advancement, densly/densely, excitment/excitement, precisly/precisely, taks/takes.

o "Drop e" rule: haveing/having, houseing/housing, liveing/living, useing/using.

o Addition of e where the root does not require it: considereing/considering, departement/department, limiteing/limiting.

o Failure to double a consonant: begining/beginning, draging/dragging, geting/getting, ploted/plotted, quiting/quitting.

o Consonant doubling with unaccented final vowel: cleanning/cleaning, dinning/dining, limitted/limited, writting/writing,

(5) Misspellings caused by failure to remember or "see" words. These students have not built a memory for the way words should look. They have trouble remembering what has been seen and "seeing what is written". There is "a lack of visual acuity with words and letters", and little or no error monitoring. Examples:

o Splitting or joining in unconventional ways: atleast/at least, in stead/instead, house whold/household, mean time/meantime, with out/without, whatso ever/whatsoever, suchas/such as, to gether/together.

o Writing a completely different word from that in mind or intended: about/out, bring/being, by/my, car/care, class/glass, country/county, community/committee, follow//fellow, farther/father, fight/flight, left/lift, many/may, most/must, never/nerve, place/play, quiet/quite, roof/root, turn/term, very/every, went/when, where/were.

o Transposition of letters: afriad/afraid, cacht/catch, destory/destroy, detialed/detailed, esle/else, flims/films, gose/goes, lairs/liars, morden/modern, obtian/obtain, sopply/sloppy, soilder/soldier, stysem/system, ture/true, trail/trial.

Shaughnessy concludes her analysis with this advice: "To teach spelling, a teacher must be prepared to move, with the student, straight into the tangle, systematically scrutinizing and classifying misspellings until patterns of difficulty begin to emerge" (p. 186).

While the second option is useful the main drawback is that it utilizes general categories, and these are devised prior to a student actually making errors. Consequently, this method is less responsive to what the student actually does.

The Third Option is Practical

Probably the easiest and most informative way to understand student reading and spelling errors is to use the following

sequence of steps (Ganschow, 1881, 1984; Hendrickson, Gable, & Hasselbring, 1988; Howell & Kaplin, 1980):

(1) First, collect a number of errors, and their corresponding target (correct) words. These would be what the student wrote (spelling) or said (reading).

(2) Second, list inferences about the errors, or otherwise comment on their main characteristics. State your view of why the student erred. Most of these comments will merely name a teaching content area. Indeed, they will be most helpful to the extent they accurately describe what the student did, simply state the obvious. Review of a detailed reading and spelling scope and sequence chart prior to this step should prove very helpful.

(3) Third, review the list of comments and find commonalities, look for patterns. These commonalities may be thought of as assumed causes, that is weak skill areas. This step is dependent on the quality of the comments in step #2, which in turn are dependent on knowledge of the subtasks of decoding and spelling.

An example of the third option, for reading, would look like this:

Word Read	Word Seen	Comment
suck	stuck	consonant combination
his	was	sight word
could	would	sight word
decide	decided	-ed ending
keep	keeping	-ing ending
gater	guitar	vowel sound
kind	kid	vowel sound
into	onto	vowel sound
is	was	sight word
their	the	sight word
when	then	consonant combination
farther	further	r-controlled vowel
eract	react	letter order
change	charge	r-controlled vowel
building	buildings	-s ending
for	to	sight word

A review of the comments in this sample suggests these assumed causes, stated as problems with: (a) sight words, (b) consonant combinations, (c) r-controlled vowels, (d) common word endings, and (e) vowel sounds. These would be the "whys", mainly, of the observed reading errors. Of course, the comments can be more specific or more general in nature, and so, in each case, will be the assumed causes.

A variation of this procedure is to use a predetermined method

for categorization of errors. Such a method, for spelling, has been devised by Spache (1981). It is based on an in-depth review of the spelling error tendencies of students in grades two to eight. Spache strongly believes the thirteen categories which resulted are entirely sufficient for practical purposes. These categories are:

(A) Omissions, in which a letter or letters of the target word are omitted in the child's attempt at spelling, without any attempt at substitution.

1. Silent letter: wether/weather, reman/remain, fin/fine.

2. Sounded letter: requst/request, plasure/pleasure, juge/judge, personl/personal.

3. Double letter: suden/sudden, adress/address, sed/seed.

(B) Additions and repetitions, in which a letter or letters are added.

4. Doubling: untill/until, frriend/friend, deegree/degree, allmost/almost.

5. Nondoubling: lettere/letter, cares/cars, tuwine/twine.

6. Transpositions: was/saw, caoch/coach, shiperlead/leadership.

(C) Phonetic substitutions, in which a letter or letters similar in sound to those of the target word are substituted.

7. Vowel sound: prisin/prison, calender/calendar, wimmin/women.

8. Consonant sound: cecond/second, vakation/vacation, jentle/gentle.

9. Syllable: purchest/purchased, financhel/financial, naborhood/neighborhood, stopt/stopped, ameless/aimless.

10. Word: weary/very, colonial/colonel.

(D) Nonphonetic substitution, in which a letter or letters dissimilar in sound are substituted in the test word.

11. Vowel: stition/station, strick/struck.

12. Consonant: watching/washing, inportance/importance.

(E) Unrecognizable or incomplete, in which substitutions are words which contain more than three errors, non-words, or partially completed words.

13. cano/cotton, di/decided, libt/liberty.

An example of the third option, for spelling, would look like this:

Word Spelled	Word Heard	Error Type	Comment
ten	team	1	vowel diagraph "ea"
y	why	2,1	"wh" sound
kit	kite	1	silent e rule
funy	funny	3	double consonant
lin	line	1	silent e rule
becm	became	2,1	"a" sound
bigr	bigger	3,2	-er
aminl	animal	6,2	revisualization
truk	truck	2	vowel + ck
at	eight	7,1	revisualization
lnch	lunch	2	short "u" sound
kuntry	country	12,1	revisualization
must	most	11	vowel substitution
doz	does	1,8	revisualization
hapyst	happiest	3,7,2	silent e rule
hapyr	happier	3,7,2	-er
clozt	closed	8,1,12	-ed
ges	guess	1,3	revisualization
ar	air	1	vowel diagraph "ai"

A review of the Spache error types in this sample suggests that this student made most errors by omission of silent, sounded, and double letters (types 1,2,3), and secondly by phonetic vowel or syllable substitution (types 7,8).

It is next necessary to look closely at the specific errors made in each category. This scrutiny reveals that the assumed causes for the most frequent errors would be:

- o Doesn't know the vowel diagraphs ea and ai.
- o Doesn't know the silent e rule.
- o Doesn't know or apply the rule for doubling consonants.
- o Has difficulty revisualizing irregular words.
- o Doesn't know the suffixes -ed and -er.

Summary

The skill based approach is concerned with identifying the specific subskills of decoding or encoding that are troublesome for a student. It would be these sub-skills that are the presumed causes of the observed errors. Hypotheses relating to states internal to the student (such as "motivation") are typically kept to a minimum or eliminated.

This approach works best when specific aspects of error words are listed. Too, a large enough sample of errors needs to be taken to insure the derived assumed causes are representative of common skill deficits.

In addition to specific parts of words that may be listed as problems for a student, the commentator may wish to attend to other aspects of errors, such as the position tendency as suggested by Harris and Sipay (1980):

o Wrong beginnings: every/very, grass/glass, back/black.

o Wrong middles: well/wall, rigs/rags, her/hear, clam/climb.

o Wrong endings: hiring/hidden, had/has, spot/spots, pin/pine, feets/feet.

ERROR ANALYSIS CAN REVEAL STRENGTHS

Since reading and spelling errors are by their very nature "mistakes", it is all too easy when reviewing student work samples to over-emphasize skill deficits. These "stand out" and, of course, red flag instructional need areas.

However the same work samples can serve as excellent sources of information about a student's spelling and word recognition skills. To illustrate this fact a review of Cramer's (1976) analysis of a story written by "David, age 7" is given. Here is David's story:

My Ded Cat

Ones I hade a cat.
He was white and yellow.
One night my father
Come fame my grandfathers house
Wenn father come home fame
my grandfathers house he said
Ruste is ded

Close scrutiny of David's story suggests the following conclusions regarding his "word handling" strengths:

(1) Although David misspelled six words, he spelled correctly eighteen words (75%). Many of the latter represent a considerable accomplishment for a seven year-old (e.g., grandfathers, said). Good sight vocabulary!

(2) ded/dead. The sound "eh" can be spelled e as in bed or as ea as in dead. It seems David is unfamilar with the latter option, spelling it with the short e he knows, which is the most common spelling.

(3) The error hade/had can be considered an over-generalization of the silent e rule. David correctly applied this rule with home, come, white, and house, for example.

(4) The error Ruste/Rusty is a sensible phonetic spelling.

(5) In spelling wenn/when David uses the second most common spelling for the "n" sound: nn as in tunnel. He correctly uses the consonant blend wh as is white, for example.

(6) In the error fame/from David uses a vowel rather than a consonant to spell the schwa sound from, and thus shows his awareness of the need for a vowel. Vowel spellings are the most variable and take the longest time for children to master.

(7) The error ones/once can be considered a homophone exchange,

created by adding an s to one. Good auditory discrimination is indicated.

(8) David's misspellings show an awareness that there is more than one way to spell a given sound (e.g., Ruste/Rusty, wenn/whenn).

(9) David rarely misspells single consonant sounds. He is just learning consonant blends, and misspellings tend to occur with these (e.g., fame/from).

(10) David uses what he knows to solve what he does not know, and reasons well by analogy, an important thinking ability. For example, he makes appropriate guesses in all instances where he has misspelled words.

In summary, when reviewing a student's work samples it is informative to balance the tally of "mistakes" against the tally of skill strengths. This balancing provides a more complete and accurate picture of the student's academic skill development. Also, this can highlight whether or not a student's errors are "logical steps in the right direction" or tend to be random and capricous in nature.

CONCLUSION

This report has presented a variety of information relating to the topic of children's reading and spelling substitution errors. The emphasis has been on specific examples of the kinds or types of mistakes actually made by students. These examples "tell the story", and are educationally relevant in that they are the kinds of events that occur in classrooms.

Throughout the focus has been on patterns or types or groupings of reading or spelling errors. This focus is practical since it helps (a) to isolate what it is in many errors that is common, and (b) hence isolates what needs teaching emphasis.

It was pointed out that the actual "label" given to an error pattern is somewhat arbitrary. The "label" should serve one purpose: To sufficiently describe the common element or elements in the list of individual errors, and in a way the serves a useful purpose for the teacher. "Labels" not meeting these criteria can be changed.

A summary overview of the main points covered in this report are as follows:

(1) The topic of this report is words, and student's difficulties in learning their Standard English pronunciations (reading) and written forms (spelling).

(2) A word is a complex of features, and the more a student is aware and knowledgeable of these the less difficulty will he or she have in word analysis.

Four indices were presented which allow understanding of "why" errors occur, and "why" some students have a harder time learning reading and spelling skills than others. This explanation was not oriented towards "internal states" (like "memory"), rather it suggested that review of the specific characteristics of the errors made usually is sufficient for understanding the nature of the difficulty.

(3) Substitution errors were defined simply as an exchange of one word (said or written) for another (seen or heard). The exchanged word may be very similar or very dissimilar to the "target" word.

(4) Children's errors are not random or capricious, rather they occur in definite tendencies or patterns. These patterns indicate or highlight what children are "thinking about" or "predicting", what "rules" they are using to judge what to say or write. These "rules" can be known by systematic review of reading and spelling errors.

(5) When collecting and reviewing errors several key concerns

must be considered. These help to produce a more reliable and accurate conclusion regarding error tendencies. These keys may be thought of as generalizations and rules of thumb.

(6) Some reports of reading and spelling errors emphasize states or events internal to students, and cite these as explanations for certain kinds of mistakes. Much can be learned from these reports, especially by review of the kinds of errors presented.

However, it is not necessary to "buy into" the hypothesized underlying causes. Indeed, one can simply note the error patterns presented, review the specific examples, and understand these as what some students do under some circumstances. Some of the examples given may help in identifying the more extreme types of errors which may indicate a serious reading or spelling problem.

(7) Guidelines were given for determining a "good phonetic equivalent". These show whether a student is exhibiting facility with the sound patterns and sequences in words.

(8) Word recognition is improved in context, when a student writes or reads a paragraph or story. More cues for word analysis are available in this situation than with isolated words.

(9) Students do not necessarily self correct their reading or spelling errors. Their accuracy can be greatly improved should they do so, even with one correction attempt.

(10) Patterns of "developmental spelling" were reviewed. Based on these patterns researchers have promoted a six-stage sequence of developing facility towards correct writing of words.

(11) The skill based approach was cited as generally the most useful. Using the guidelines given educators can relatively easily isolate from reading or spelling errors those "assumed causes" that likely could benefit from increased instructional emphasis.

(12) Error analysis can reveal those areas of teaching/ learning that are well developed, are age appropriate, or are advanced for the grade. Any consideration of student errors should be accompanied by at least a scan of reading and spelling strengths.

When students make mistakes in reading and spelling we need to find out what it is that they cannot do that is resulting in the poor reading and spelling. The error pattern approach, whether used systematically in detail, or rather generally as a "good guide", can help provide this information.

Also, this approach has practical educational value in that it is not bogged down with a particular theory about "why" reading and spelling errors occur. Rather it emphasizes the kinds of mistakes made, as regards words and their known characteristics, and the student's experiences with them.

So, after concentrating all these pages on exactly how to spell words wrong, and double checking that indeed they were incorrect, it is appropriate to end at the beginning (thanks to Bissex, 1980) by taking down the GNYS AT WRK sign and heading for...

BATLZ AV WESKY

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